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Ultrasonographic Evaluation of Tumorous Lesions in Digital Vessels

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Ultrasonography has recently been used for evaluation of various conditions in Orthopaedics. Ultrasonographic examination is a noninvasive screening test especially for soft tissue masses. Ultrasonography is also a useful and essential diagnostic tool in cardiovascular disorders because real-time images of heart and vessels can be obtained. However, there have been few reports which describe ultrasonographic evaluation of tumorous lesions in digital vessels. In this paper, such lesions in two cases were evaluated by ultrasonography. An aneurysm of the digital artery is one of the definite candidates for ultrasonographic evaluation.

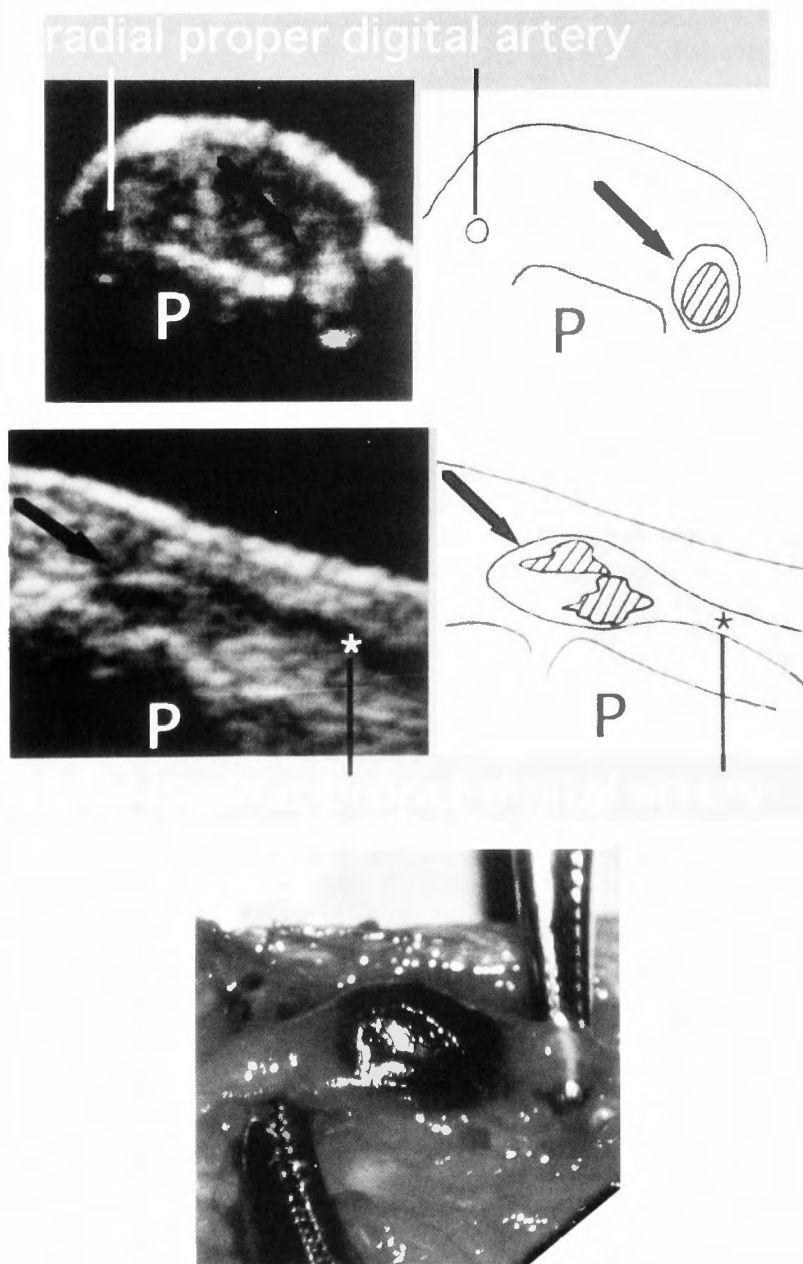
Case Reports

Case 1. A 16-year-old girl was seen because of a soft tissue mass with 1 week's duration at the level of the interphalangeal joint of the left thumb. Several hours after a direct blow of her left thumb by failing to catch a softball, a painful lump had appeared concomitant with a cold sensation on the palmar aspect of the thumb. A subcutaneous hard and non-pulsatile mass 7 mm in diameter was found on the ulnar aspect of the interphalangeal joint of the thumb. There was tenderness with palpation. Ultrasonographic examination was performed with a real-time linear transducer at a frequency of 7.5 MHz. The radial proper digital artery was displayed as a hypoechoic cavity. In contrast, the mass was predominantly echogenic, surrounded by hypoechoic areas on transverse sonograms (Fig. 1-A). The afferent ulnar proper digital artery was identified on longitudinal sonograms (Fig. 1-B). Slight pulsation of the mass was seen as well as pulsation of the radial digital artery. Application of firm pressure over the radial and ulnar arteries at the distal forearm resulted in disappearance of the pulsation of both the mass and the radial digital artery. Based on the sonographic findings, the mass was diagnosed as an aneurysm with thrombosis. At operation, a dirkish aneurysm of the ulnar proper digital artery was revealed (Fig. 1-C). After resection of the aneurysm, the artery was reconstructed by an autologous vein graft. A clot was found to occupy the lumen of the vessel when the resected aneurysm was opened. Histological examination demon-

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索引用語: 超音波検査, 軟部腫瘍, 外傷性動脈瘤, 手指, 手指血管

Key words: ultrasonography, soft tissue mass, traumatic aneurysm, digit, digital vessel



Figs. 1-A to C Case 1. (A) Transverse scan of left thumb at the interphalangeal joint shows a complex mass containing echogenic material surrounded by sonolucent portions (arrow). The radial proper digital artery is also shown. P=proximal phalanx of the thumb. (B) Coronal view of left thumb demonstrates afferent ulnar proper digital artery (*) leading to proximal portion of a complex mass (arrow) that consists of echogenic material and hypoechoic fluid. P=proximal phalanx of the thumb. (C) Operative photograph shows an aneurysm of the ulnar proper digital artery.

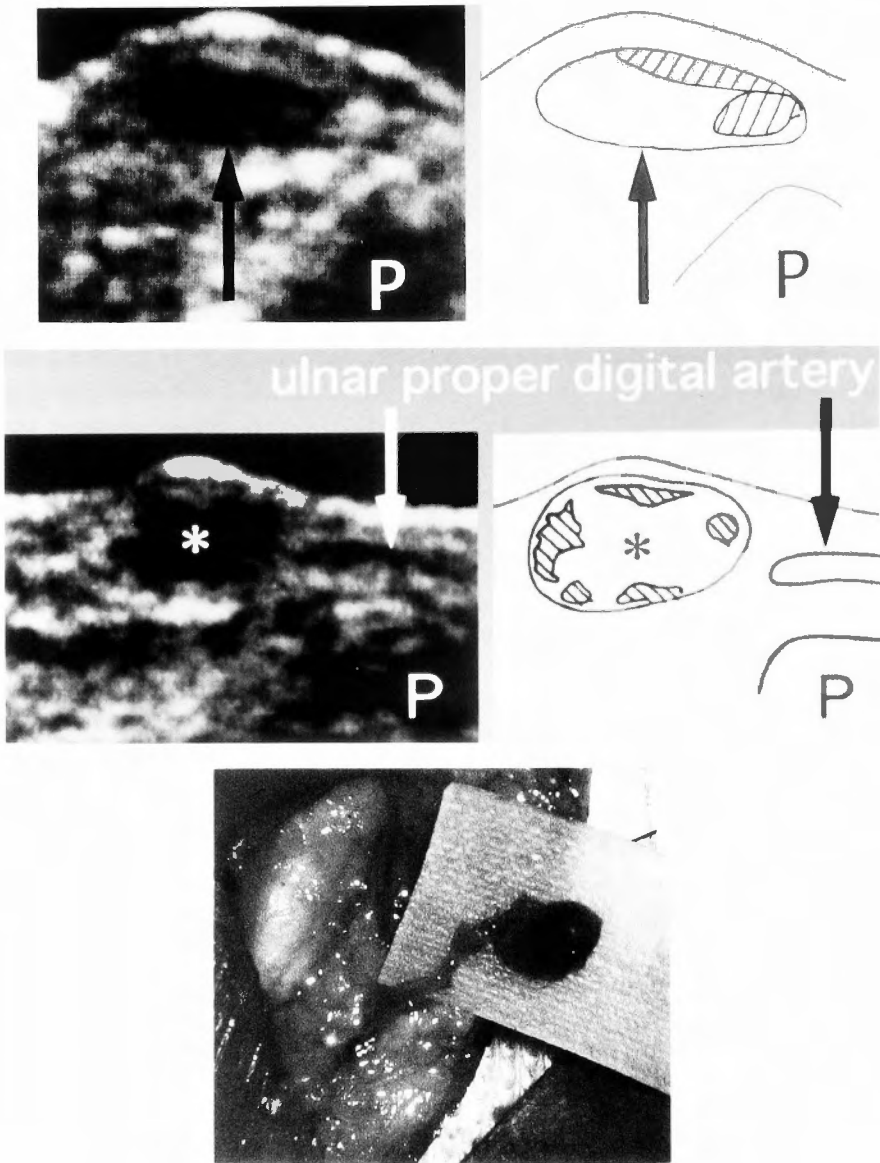
strated fibrous tissue and scar without evidence of muscle or elastic fibers within the vessel wall¹⁾, and confirmed the diagnosis of a thrombosed false aneurysm.

Case 2. A 49-year-old woman noticed a soft tissue mass without any cause at the level of the proximal interphalangeal joint of left ring finger. Gradual growth of the painless mass in three weeks made her visit the hospital. On physical examination, a subcutaneous mass 5 mm in diameter was palpable on the ulnar aspect of the proximal interphalangeal joint of the ring finger. It was hard, but not pulsatile. There was no tenderness over the mass with palpation. Ultrasonography was used for evaluation of the mass with a real-time linear transducer at a frequency of 7.5 MHz. The mass was predominantly hypoechoic with clear margins and no pulsation of the mass was observed on transverse sonograms (Fig. 2-A). In addition, some echogenic portions were observed inside the mass (Fig. 2-A). No communication was found between the mass and the ulnar digital artery on longitudinal sonograms (Fig. 2-B). It was difficult to distinguish the mass from other cystic lesions by ultrasonography. The mass of the ring finger was explored under tourniquet control and magnification. A dirkish mass connected with a vein was revealed (Fig. 2-C). The mass was resected after ligation of the vein and thereafter opened, disclosing a clot inside the vessel. The diagnosis of papillary endothelial hyperplasia of vein with organized thrombus was made by histological examination.

Discussion

Ultrasonography has recently received much attention in its application to the evaluation of soft tissues of the extremities. Ultrasonography permits both depiction in any orientation and real-time dynamic study. Muscles, tendons, arteries, veins, nerves and subcutaneous tissues can be observed by ultrasonography²⁾. Whereas a role of ultrasound in evaluation of soft tissue masses has been described in a series of studies, few reports have focused on sonographic evaluation of tumorous lesions in digital vessels.

Proper palmar digital arteries are readily identified on real-time examination with 7.5 MHz probes because of the pulsation of digital arteries. As in the current case (Case 1) together with a previously reported case³⁾, ultrasonography provides useful diagnostic information about aneurysms of the digital arteries. An aneurysmal mass of the digital artery can be visualized as a sonolucent cavity with pulsation on sonograms. Thrombus in an aneurysm is seen as an echogenic mass surrounded by hypoechoic portions (Figs. 1-A and B). Ultrasound also reveals the communication between the afferent digital artery and the aneurysm (Fig. 1-B). Application of pressure over the radial and ulnar arteries at the distal forerarm is a supportive maneuver for diagnosis of an aneurysm of the digital artery because pulsation of the aneurysm disappears by the application on real-time images. Although aneurysms of the digital arteries are rare, a high index of suspicion is necessary to avoid improper treatment of the patient. Without thrombus inside an aneurysm, a tender, pulsatile mass is observed in approximately 50% of patients on physical examination. The lack of pulsation of an aneurysm could lead to misdiagnosis of the subcutaneous mass as a soft tissue lesion like an abscess, cyst, or neuroma. There are various diagnostic tools for evaluation of aneurysms of the digital arteries. While angiography and nuclear scanning are helpful in evaluating aneurysms⁴⁾, they are invasive procedures and can cause possible complications. In contrast, ultrasonographic examination is a noninvasive and readily available diagnostic test for the evaluation of aneurysms of digital arteries. As a screening test, ultrasonography should first be employed in suspected cases of an aneurysm



Figs. 2-A to C Case 2. (A) Transverse sonogram of left ring finger at the proximal interphalangeal joint demonstrates a complex mass that consists predominantly of sonolucent fluid and partially of echogenic portions (arrow). P=proximal phalanx of the ring finger. (B) Longitudinal sonogram of the ring finger shows no communication between the ulnar proper digital artery (arrow) and a complex mass (*). P=proximal phalanx of the ring finger. (C) Operative photograph demonstrates a mass lesion connected with a vein.

of the digital artery. Further technological improvements promise a significant role for ultrasound in the evaluation of aneurysms and probably of other lesions of the digital arteries.

In contrast to the digital arteries, it is difficult to visualize the veins of digits on sonograms. The

caliber of veins varies according to gravity or compression maneuvers and veins may collapse under a slight pressure on the probe²⁾. As in the current case (Case 2), some tumorous lesions of vein in digits can be observed on ultrasonograms. However, similar to the sonograms of papillary endothelial hyperplasia of vein with thrombus (Figs. 2-A and B), some cysts and abscesses may be seen as hypoechoic areas containing echogenic portions⁵⁾. At present, ultrasonography cannot provide sufficient information regarding the differentiation between venous and other soft tissue lesions in digits.

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和文抄録

手指血管腫瘍性病変に対する超音波検査

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超音波検査は非侵襲的で簡便に行える検査であるが、手指血管性病変の超音波検査に関する報告は少ない。2例の自験例を元に、手指動静脈の腫瘍性病変に対する超音波検査の有用性について検討した。

超音波検査で外傷性仮性動脈瘤は、血栓を示す echogenic material の周囲を hypoechoic area が取り囲むように描出され、拍動を認めた。前腕遠位で橈骨動

脈と尺骨動脈を圧迫すると動脈瘤の拍動が消失した。手指動脈瘤は超音波検査で診断できる可能性が高い。

静脈性腫瘍を生ずる papillary endothelial hyperplasia of vein with organized thrombus の超音波画像は、血栓を示す echogenic material を含む sonolucent area として描出された。静脈性腫瘍と血管以外の腫瘍性病変との超音波による鑑別は難しいと思われた。